Journal of Animal and Poultry Production

Journal homepage: www.japp.mans.edu.eg
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Growth Performance and Carcass Traits of Broiler Chicken Diets Containing Different Fat Source

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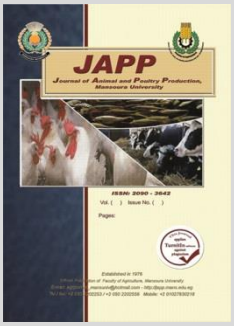

ABSTRACT

This study was investigated to determine the effects of two separate sources of fat (sunflower oil, tallow) on growth efficiency and carcass characteristics of broiler chicks reared at age 42 days. using 160 (Ross 308) broiler chicks of one day old. Chicks were distributed fully randomized to 4 treatments based on a system with 4 replicates of 10 chicks. The dietary treatments consisted of: T1, diet containing 5% tallow until the end of the experiment, T2 diet containing 5% sunflower oil until the end of the experiment, T3 diet containing 5% tallow for 21 days of age (grower period) then sunflower oil till 42 days of age (finisher period), T4 diet containing 5% sunflower for 21 days of age then 5% tallow until 42 days of age. The performance parameter measured in 21 and 42 days the carcass parameters were measured in the end of the study. The results show that T2 use 5% sunflower oil until the end of the experiment in grower period, weight gain and feed conversion ratio were significantly ($p>0.05$) improved compared to those nursed by other diets therapies. However, the results in finisher period in T1 there was significant effect ($p>0.05$) in intake of feed compare to the other treatments. As well as the results of accumulative values of these three traits, a significant ($p>0.05$) increase in accumulative body weight and weight gain in T3 and were significantly ($p>0.05$) improved the conversion ratio in T2 and T3 compared to other treatments. The results of carcass traits there were significant effected ($p>0.05$) in dressing percentage in T1 and T2 compared to other treatments but there were no significantly affect in carcass weight, gizzard and abdominal fat percentage.

Keywords: Tallow, Sunflower oil, Broiler feeding

INTRODUCTION

Despite its relatively low cost, Tallow is a widely used lipid source in countries with large red meat industries. Tallow thus contains high saturated fatty acid concentrations, such as stearic and palmitic acids, these are not polar and therefore are seldom utilized for poultry (Tancharoenrat *et al*., 2013, 2014). Fats provide a concentrated energy source, and relatively minor changes in the rates of inclusion may have major effects on ME diet. The main fat source used in poultry feeding has historically been Tallow. Nevertheless, there has been less use of pure tallow over the past 10 years, and greater use of mixed fats and oils. Tallow is solid at room temperature and this, particularly when heated, poses some problems at the mill. Peebles *et al*., (2000); Baião and Lara, (2005) and Latshaw, (2008) showed that dietary fat improved digestive passage levels through the digestive system to better absorb and use nutrients. The fatty acid profiles are the key factor in deciding digestibility, Celebi and Utlu (2004) showed that improved use of unsaturated fats leading to higher metabolizable energy than saturated fats was also stated in another study by Snaz *et al*., (2000) that different dietary fats could affect fat metabolism and deposition in poultry. Adding fat to nutrition as energy sours get better the absorption of fat-soluble vitamins, and boost diet's palatability. For more details, Sanz *et al*. (2000) show that there are some Fat sources supplies for, both from animal and vegetable products and from the rendering industry. Feeding broilers with sunflower oil or tallow in diet and use of saturated fat resulted in major deposits of abdominal grease compared to non-feeding birds (Sanz *et al*. (1999). In Newman *et al*. (2002) research it was recorded that broilers in the diet fed 8 percent beef tallow a substantial reduction in feed competence compared to other birds fed sunflower or fish oil. It was also recorded that add three percent of vegetarian oil to broiler feeding result in a significant betterment in ratio for body weight and feed conversion relative to birds feeding animal fat, but no significant difference was found in carcass characteristics and organ weight among classes. Shahryar *et al*, (2011) demonstrated that the introduction of %6 percent animal fat in broiler diet resulted in a rise in abdominal fat and gizzard weight compared to that of unfed animals. The research was performed to establish the impact of two separate Source fat of tallow and sunflower oil on the growth output of broiler chickens and their carcass traits.

MATERIALS AND METHODS

One hundred sixty broiler chicks of strain Ross 308 were used in this experiment with four different dietary treatments, four replications for each treatment and 10 chicks per replication. Was raised at poultry experimental fields of Bakrajo, college of Agricultural engineering Sciences, University of Sulaimany. Tow period were examined starter period from 0 to 21 and Finishing period from 22 to 42 days, ad-libitum was provided for feed and water, 23% CP and 3000 Kcal ME / Kg were fed for birds in the starting period and 20% CP and 3200 Kcal ME / Kg in the finishing period;

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DOI: 10.21608/jappmu.2020.108823

all treatments in both periods contain the same protein and energy: T1 diet include 5% tallow in starter and finisher, T2 diet include 5% sunflower oil in starter and finisher period, T3 diet include 5% sunflower oil in starter period than 5% tallow in finisher period and T4 diet include 5% tallow in starter period than 5% sunflower oil in finisher period. At the end of the experiment, six chicken selected randomly from each treatment group fasted for 12 hours, the slaughter procedure was done for carcass weight, Dressing rate, gizzard and abdominal fat Using Duncan's multiple-range test (Duncan1955), substantial variations between the means of the traits were found. Beneath likelihood P<0.05.

Table1. Ingredient in the starter and finisher diet.

Ingredients	% diet	
	Starter	Finisher
Yellow Corn	43	50
Soya bean meal	31.5	24.5
Protein conc.*	5	5
Wheat	5	10
Wheat Bran	10	5
Sunflower oil & Tallow	5	5
Vit & Min **	0.1	0.1
Dicalcium phosphate	0.1	0.1
Salt	0.3	0.3
Total	100	100
	Calculated composition	
Protein	23	20
ME Kcal / Kg	3000	3200
Calcium	0.94	0.74
Phosphorus	0.51	0.38
Lysine.	1.3	1.12
Methionine.	0.72	0.55
Meth. to Cyst.	0.96	0.90

***(WAFI) Protein concentrate used in the diets which contain: 40 % crude protein, 2100 Kcal ME / Kg.**

RESULTS AND DISCUSSION

Table (2) Show the effect on body weight, body weight gain, intake of feed and FCR of fat sources (sunflower oil and tallow) of broiler chicken during the initial period. there was significant (P<0.05) effect to improve body weight, weight gain and FCR in treatments were used sunflower oil in starter period, the higher value of body weight were obtained from T2 which is (1217g) but the lower value obtained from T1 which is (1080g), and the higher value of body weight gain were obtained from T2 which is (1168g) but the lower value obtained from T1 which is (1030g), also the higher value of feed conversion ratio obtained from T2 which is (1.2) but the lower value obtained from T1 and T4 which is (1.36), No substantial (P>0.05) differences in feed intake have been observed for growth performance across different fat source treatments. The performance improved in that experiment was referred to more digestibility of sunflower oil most vegetable oils are ideal ingredients for very young birds contrarily young chickens don't digest tallow well.

Table (3) Show the effect on body weight, body weight gain, intake of feed and FCR of fat sources (sunflower oil and tallow) of broiler chicken during the finisher period. Important effect (P<0,05) on feed intake between treatments in finisher period, the higher value of feed intake were obtained from T1 which is (3250g) but the lower value obtained from T2 and T4 which is (3050g), also no significant effect (P>0,05) on body weight, weight gain and FCR in treatments had offered different fat source on growth performance.

Table 2. Effects of different sours of fats on broiler performance during grower period (Mean±SE)

Treatment	Feed Intake (g) Feed	Body Weight (21) day	Weight Gain(g)	Conversion Ratio
T1	1408 ± 20.50^{A}	1080 ± 20^{B}	1030 ± 20^{B}	1.36 ± 0.29^{B}
T2	1460 ± 23.15^{A}	1217 ± 33^{A}	1168 ± 32^{A}	1.20 ± 0.29^{A}
T3	1390 ± 21.22^{A}	1200 ± 25^{A}	1150 ± 25^{A}	1.25 ± 0.04^{A}
T4	1438 ± 30.12^{A}	1105 ± 15^{B}	1055 ± 40^{B}	1.36 ± 0.15^{B}

Different Superscripts differ greatly across columns.
***=Significant at P<0.05.**

Table 3. Effects of different source of fats on broiler performance during finisher period (Mean±SE)

Treatment	Feed Intake(g) Feed	Body Weight (42) day	Weight Gain(g)	Conversion Ratio
T1	3250 ± 20.50^{A}	2680 ± 30^{A}	1601 ± 20^{A}	2.02 ± 0.29^{A}
T2	3050 ± 23.15^{B}	2746 ± 35^{A}	1529 ± 32^{A}	1.99 ± 0.29^{A}
T3	3150 ± 21.22^{AB}	2850 ± 33^{A}	1700 ± 25^{A}	1.85 ± 0.04^{A}
T4	3050 ± 30.12^{B}	2710 ± 40^{A}	1555 ± 40^{A}	1.96 ± 0.15^{A}

Different Superscripts differ greatly across columns.
***=Significant at P<0.05.**

Table (4) presented the dietary fat impact source on broilers growth performance during all rearing period as cumulative, there was significant [P<0.05] effect of Body weight, FCR and weight gain in treatments were used sunflower oil during all rearing period, the higher value of body weight were obtained from T3 which is (2850g) but the lower value obtained from T1 which is (2680g), and the higher value of body weight gain were obtained from T3 which is (2750g) but the lower value obtained from T4 which is (2610g), also the higher value of feed conversion ratio obtained from T3 which is (1.65) but the lower value obtained from T1 which is (1.77), however, Not significant (P>0.05) differences Intake of feed were observed among different treatments of fat source on growth performance.

Such Findings vary from those of Velasco *et al*. (2010), who observed greater FCR values in broiler chickens fed diets including sunflower oil relative to those diets fed with palm oil. Several researchers (Zollitsch *et al*., 1997; Crespo and Esteve-Garcia, 2001) found changes in broiler FCR values with certain degree of dietary fat source unsaturation.

Table 4. Effects of different source of fats on broiler performance all rearing periods (accumulative) (Mean±SE)

Treatment	Feed Intake (g) Feed	Body Weight	Weight Gain(g)	Conversion Ratio
T1	4658 ± 20.50^{A}	2680 ± 30^{B}	2630 ± 20^{B}	1.77 ± 0.19^{B}
T2	4510 ± 23.15^{A}	2746 ± 35^{B}	2697 ± 32^{B}	1.67 ± 0.19^{A}
T3	4540 ± 21.22^{A}	2850 ± 33^{A}	2750 ± 25^{A}	1.65 ± 0.04^{A}
T4	4488 ± 30.12^{A}	2710 ± 40^{B}	2610 ± 40^{B}	1.71 ± 0.15^{B}

Different Superscripts differ greatly across columns.
***=Significant at P<0.05.**

In younger chickens, the digestibility of fats is reduced, since the lipase they secrete is not enough. Although some reported reports suggest that the average net duodenal lipase secretion rises by 20-fold with age (Noy and Sklan,

1995), lipase secretion is less drastic when measured per gram of ingested feed. This suggests that younger birds do not have as insufficient lipase secretion as anticipated when evaluating their feed consumption (Meng *et al*., 2004).

Table (5) shows presented the dietary fat impact source on broilers carcass weight, dressing percentage, gizzard percentage and abdominal fat during all rearing period there was significant (P<0.05) effect to dressing percentage the higher value of were obtained from T2 which is (75±1.6 %) but the lower value obtained from T3 which is (72±1.0%), however, Not significant (P>0.05) differences in carcass weight, gizzard and abdominal fat due to the introduction of sunflower oil, tallow or mixture graded rates. These findings are in agreement with Bilal *et al*. 2002, Anjum *et al*. 2004, there was no substantial change in carcass yield attributable to the introduction of graded amounts of sunflower seed, tallow or mixture of each of these results.

Being heavily saturated, the tallow is not easily digested by young chickens, but there is some proof that young turkeys have improved use. Tallow's digestibility can be greatly enhanced by adding bile salts which indicate this is a limiting feature of young chicks. Nevertheless, the usage of these salts is not economical, and the use of pure tallow in diets for birds under the age of 15-17 days must be seriously limited.

In freshly hatched chicks the capacity to ingest and consume dietary fat is poorly established the bile secretion seems to be first restricting and maybe next restricting the lipase secretion or other physiological element (krogdahl, 1985). Noy and Sklan, (1995) reported to have increased lipase, trypsin and amylase secretion in duodenum by 20 to 100 folds between days 4 and 21 post-hatch, but the lipase activity was observed to increase slower than other enzymes. Additionally, FABP synthesis has been reported to be inadequate in very yang birds, but rises after week 4 of life (katongole and March 1980) generally the evidence suggest that the capacity to digest and consume fat in birds improves rapidly after the first few days of life and grows with advancing age (Renner and hill 1960).

Rener and hill (1960) studied the usage by chickens at various ages of maze butter, lard, and tallow, and noticed that the capacity to use tallow increased with age.

According to Freeman (1984), the potential of young birds to generate pancreatic lipase and bile is small, contributing to decreased digestion and absorption of the dietary food. Studying the production of digestive organs and enzymes in broilers, Nir *et al*. (1993) observed that pancreatic lipase activity steadily rose to 15 days of age before it peaked.

Table 5. Effects of different source of fats on carcass traits (Mean±SE).

Treatment	Carcass weight	Dressing %	Gizzard %	Abdominal fat %
T1	1893.6± 25.20 ^{A}	72±1.3 ^{A}	0.97 ± 0.06 ^{A}	2.0 ± 0.01^{A}
T2	2022.7± 30.60 ^{A}	75±1.6 ^{A}	0.98 ± 0.24 ^{A}	1.10 ± 0.01^{A}
T3	2052.0± 25.40 ^{A}	72±1.0 ^{B}	1.0 ± 0.14 ^{A}	1.9 ± 0.15 ^{A}
T4	1905.3± 23.50 ^{A}	73±1.5 ^{B}	0.97 ± 0.15 ^{A}	1.95 ± 0.15 ^{A}

Similar superscripts indicate Last squares means are substantially different inside a column;

***=Significant at P<0.05; SE=standard Error.**

CONCLUSION AND RECOMMENDATION

According to the results were obtained from current study we can conclude that using different fat sources (sunflower oil, tallow) on Growth efficiency of broiler chickens and carcass traits improve body weight, FCR and weight gain in treatments groups, therefore, It can be concluded that this strategy can effect economically to decrease the cost of feeding in broiler chicken production with low cost, in commercial farm. Outcomes of the present research recommended and Suggested the addition with a sunflower oil in starter period and tallow in finisher period in broiler diet supported positively growth performance.

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أداء النمو وصفات الذبيحة في فروج اللحم المغذاة على اعلاف تحتوي على مصادر دهون مختلفة

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تستهدف الدراسة تحديد تأثير مصدرين منفصلين من الدهون (زيت عباد الشمس، الشحم) على كفاءة النمو وصفات الذبيحة لفروج اللحم التي تم تربيتها لمدة 42 يوما. استخدم في هذه التجربة مائة وستين فرخا من أفراخ فروج اللحم نوع (Ross 308) وبعمر يوم واحد. وزعت هذه الطيور عشوائياً على أربع معاملات وقسمت كل معاملة إلى أربع مكررات وبواقع 10 طيراً لكل مكرر. تتكون المعاملات الغذائية من: T1: غذيت على علف تحتوي على 5% شحم حتى نهاية التجربة. T2: غذيت على علف تحتوي على 5% زيت عباد الشمس حتى نهاية التجربة. T3: غذيت على علف تحتوي على 5% شحم لمدة 21 يوم (فترة النمو) ثم غذيت على علف تحتوي على 5% زيت عباد الشمس حتى نهاية التجربة في عمر (42) يوم فترة النهاية. T4: غذيت على علف تحتوي على 5% زيت عباد الشمس لمدة 21 يوم (فترة النمو) ثم غذيت على علف تحتوي على 5% شحم حتى نهاية التجربة في عمر (42) يوم فترة النهاية. تم قياس أداء ومعايير النمو في المعاملات في عمر (21 و42) يوم، وتم اخذ قياسات صفات الذبيحة في نهاية التجربة. اظهرت النتائج في فترة النمو تحسنا معنويا ($p>0.05$) في وزن الجسم والزيادة الوزنية وكفاءة التحويل الغذائي في معاملة T2 التي غذيت على 5% زيت عباد الشمس حتى نهاية التجربة بالمقارنة مع المعاملات الاخرى. مع ذلك النتائج في الفترة النهائية في المعاملة T1 كان هناك تأثير معنوي ($p>0.05$) على العلف المستهلك عند المقارنة مع المعاملات الأخرى. اما النتائج في قيم التراكمية في الصفات الثلاث نتيجة تأثير المصدرين من الدهن أدى الى حصول ارتفاع معنوي ($p>0.05$) في وزن الجسم والزيادة الوزنية في معاملة T3 وتحسن معنوي ($p>0.05$) في معامل تحويل الغذائي في معاملات T2 وT3 عند المقارنة مع المعاملات الاخرى. اظهرت النتائج في صفات الذبيحة تأثير معنوي ($p>0.05$) في نسبة التصافي في معاملات T1 وT2 عند المقارنة مع المعاملات الأخرى ولكن لم تكون هناك تأثير معنوي في وزن الذبيحة ونسبة وزن القانصة ونسبة الدهون في البطن.

الكلمة المفتاحية: الشحم، زيت عباد الشمس، تغذية فروج اللحم.